SANDPIPER®
A WARREN RUPP, INC. BRAND

IDEX
FLUID & METERING

SERVICE AND OPERATING MANUAL

PULSE OUTPUT KIT
Design Level 5

WARNING!

Pulse Output Interface Kits cannot be used if pump is to be submerged.

Pulse Output Interface

The Pulse Output Interface Kits are designed for easy field installation. The Kits are also available factory-installed on new pumps. The Pulse Output Interface Kit mounts on the pump and provides electrical pulses to operate the Warren Rupp Batch Control/Stroke Counter, or a customer-supplied control. The unit creates an electrical interface between the control and the air-powered pump. Pulse Output Kits can be purchased separately, for use in applications where a process controller is already present in a system. This provides a direct interface with the pump and the customer's system.

Operation

Each pump stroke generates a signal through a proximity sensor (PNP) on either end of the air valve. As the air valve reciprocates back and forth during pump operation, targets on either end of the spool activate their respective proximity sensors. Each sensor signals the control to register one count on the stroke counter / batch control unit. This method provides a positive signal for every pump stroke, but with very few wearing parts.

Connecting a Factory-Installed Kit

Pulse Interface Kits are available factory-installed on new SANDPIPER and MARATHON diaphragm pumps. When installing, always refer to the service manual for pump installation and operation recommendations. After installing the pump, connect the interface to the control source. To connect the interface to the control source:

- Install input cable according to the wiring diagram for your specific interface kit.
- Connect to Warren Rupp Batch Controller or existing system control.

Field Installation of Kit

Before adding an interface kit to an existing SANDPIPER or MARATHON pump, verify the compatibility of the pump model, kit number and voltage being used. A complete listing appears on page 3

Field Installation

- Remove the main air valve body assembly and gasket.
- Install the Pulse Output Kit,and pulse output pump adapter kit tighten and torque the screws according to the pump service manual instructions.
- Refer to the applicable wiring diagram when connecting to control source.

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Replacing Proximity Sensors

CAUTION!

Safety clip locks pump for security or service. Pump will NOT operate with safety clip in place.

- Shift the main air valve spool toward the sensor being replaced.
- Lock the spool in place by inserting the safety clip (included in the kit) through the small hole of the opposite end cap.
- Disconnect the sensors from terminal junction.
- Loosen the hex nut holding the proximity sensor in place.
- Remove the sensor from the end cap. Install the replacement sensor.
- Set the clearance between the sensor and the actuator pin to .015" (.38mm), using a feeler gauge or shim stock. The gauge or shim stock should slide freely, while making contact.
- Tighten the hex nut provided with the replacement proximity sensor to lock in place.
- Reattach terminal juction to proximity sensor
- Remove the safety clip from the end cap. The pump is now ready for use.

Pump Selection & Installation

Air-operated, double diaphragm pumps (AODD) are semi-positive displacement pumps designed with flexible diaphragms. AODD have successfully been applied in metering and batching applications where system design allows for minimal variation of:

- *Air Inlet Pressure*
- *Suction Head/Lift*
- *Discharge Head*
- *Pump Speed (Stroke Rate)*
- *Product Viscosity*
- *NPSH(a)*

Variations of any of the above can result in variable, volumetric displacement per pumping stroke which normally holds to +/- 1% to 3% repeatability. To verify actual displacement in your application, it is essential to follow a calibration procedure. This allows the batch control to be set for the actual average displacement per pump stroke. The larger the calibration volume, the more precise the average.

Sizing

Follow the normal pump sizing procedures using published data. DO NOT OVERSIZE THE PUMP. Select the smallest pump suitable for your use to ensure greater accuracy. The batch size from a SANDPIPER pump will be within +/- one stroke.

Installation

To ensure consistent repeating of the batch size, keep the suction piping short, straight, simple, and as large a diameter as is practical.

Differential pressure across the check valves of the pump will insure that the check valves seat properly and consistently. Discharge pressure must always be greater than the suction pressure in the application.

For consistent fluid displacement and system accuracy it is mandatory to keep the discharge line full of product from the pump to the point of discharge. A one-way check valve installed in the end of the discharge line will accomplish this.

In suction lift applications the pump must be kept primed at all times. Suction lift must be kept to a minimum and a foot valve may be required in the suction line to keep the pump primed.

In flooded suction applications a back pressure device located in the discharge line may be required to insure sufficient differential pressure across the pump check valves. The one-way check valve mentioned above may provide sufficient back pressure to properly seat the pump check valves although additional means may be necessary in some applications.

Install an air line pressure regulator. This ensures a constant air pressure feed to the pump eliminating low to peak usage pressure spikes which will increase and or decrease the stroke rate of the pump resulting in variable (non-controlled) flow.

Pulse Output Literature Ordering Information

IMPORTANT

Pulse Output Interface Kit Selection Instructions

Step 1 Determine the required system voltage and then chose one of the three Pulse Output Kits from Table 1. Each kit will include Proximity Sensor, Field Connector, and Terminal Junction

Step 2 Determine the pump model being used and then choose the required Pulse Output Adapter Kit from Table 2. Each Kit include all parts required for field installation of kit, which may include Air Valve Assembly, Gaskets, Spacer Plate, and/or Hardware

Step 3 Order the combination of the Pulse Output Kit and the Pulse Output Adapter Kit together to successfully field install a Pulse Output Interface.

Note: When ordering a pump with a factory installed Pulse Output interface refer to Pump and Assecories Price Sheet for proper pump model number

Assembly Notes

Note 1 Pulse Output Adapter Kits do not not require an Adapter Kit to install Pulse Output kits to that particular pump. Order only the appropriate Pulse Output Kit (See Table 1)

Table 1

Pulse Output Kits		
System Voltage	Kit Number	Comment
Standard 10-30VDC	475-244-001	Refer to Page 4
Standard 110VAC	475-244-002	Refer to Page 5
Standard 220VAC	475-244-002	Refer to Page 6
Intrinsically Safe 10-30VDC, 110VAC, & 220VAC	475-244-003	Refer to Page 7

Table 2

Pulse Output Adapter Kits					
Pump Class	Size	Pump Model		Kit Number	Comment
Standard Duty Non-Metallic	1/4"	PB1/4-A / MP01P		475-245-001	Refer to Page 8
	1/2"	S05 / M05		475-245-002	Refer to Page 9
	3/4"	S07 / M07		475-245-002	Refer to Page 9
	1"	S10 / M10		475-245-002	Refer to Page 9
		S1F / M1F		475-245-003	Refer to Page 10
	1 1/2"	S15 / M15		475-245-003	Refer to Page 10
	2"	S20 / M20		475-245-003	Refer to Page 10
	3"	S30 / M30		475-245-003	Refer to Page 10
Standard Duty Metallic	1/2"	S05 / M05		475-245-002	Refer to Page 9
	1"	S1F / M1F		475-245-003	Refer to Page 10
	1 1/2"	S15 / M15		475-245-003	Refer to Page 10
	2"	S20 / M20		475-245-003	Refer to Page 10
	3"	S30 / M30		475-245-003	Refer to Page 10
Pump Class	Size	Pump Model	Mid-Section	Kit Number	Comment
Heavy Duty Ball	1"	SB1 / SB25		475-245-004	Refer to Page 11
	1 1/2"	HDB1 1/2 / HDB40	Aluminum	475-245-005	Refer to Page 12
			Cast Iron	475-245-006	Refer to Page 13
	2"	HDB2	Aluminum	475-245-005	Refer to Page 12
			Cast Iron	475-245-006	Refer to Page 13
	3"	HDB3		475-245-007	Refer to Page 14
	4"	HDB4		475-245-007	Refer to Page 14
Heavy Duty Flap	1"	HDF1 / HDF25		475-245-004	Refer to Page 11
	2"	HDF2	Aluminum	475-245-005	Refer to Page 12
			Cast Iron	475-245-006	Refer to Page 13
	3"	HDF3-M		475-245-007	Refer to Page 14
		HDF3-A		475-245-008	Refer to Page 15
	4"	HDF4-M		475-245-007	Refer to Page 14
		HDF4-A		475-245-008	Refer to Page 15
Containment Duty	1"	ST1 / ST25			Refer to Note 1
		ET1-M / MP04D			Refer to Note 1
	1 1/2"	ET1 1/2-SM / MP05D			Refer to Note 1
		ET1 1/2-M / MP07D			Refer to Note 1
		ST1 1/2 / ST40		475-245-009	Refer to Page 15
	2"	ET2-M / MP08D			Refer to Note 1
	3"	ET3-M / MP12D			Refer to Note 1
Special Duty	2"	MSB2		475-245-005	Refer to Page 12
		MSA2		475-245-005	Refer to Page 12
		W09-2			Refer to Note 1
	3"	W09-3			Refer to Note 1
		W15-3			Refer to Note 1
	4"	W15-4			Refer to Note 1

Pulse Output Pump Kit: 475-244-001

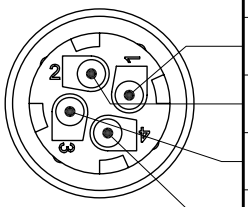
10-30VDC Wiring Diagram

475-244-001 Pulse Output Pump Kit

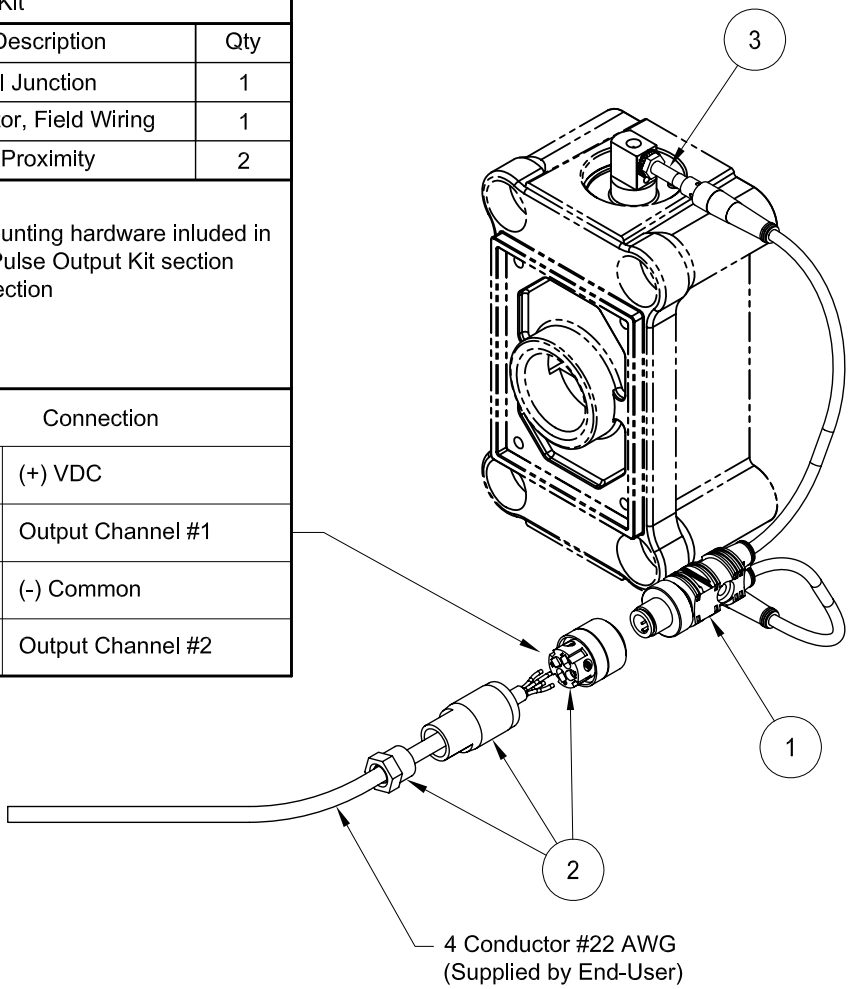
Item	Part Number	Description	Qty
1	111-009-000	Terminal Junction	1
2	241-004-000	Connector, Field Wiring	1
3	724-004-000	Sensor, Proximity	2

Notes:

1. Air Valve, Gasket, and/or mounting hardware inluded in Pump Adapter Kit. Refer to Pulse Output Kit section chart (page 3) for proper selection



Connection	
1	(+) VDC
2	Output Channel #1
3	(-) Common
4	Output Channel #2



Pulse Output Pump Kit: 475-244-002

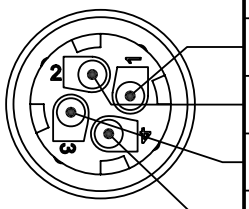
110VAC Wiring Diagram (For Non-Hazardous Locations)

475-244-002 Pulse Output Pump Kit

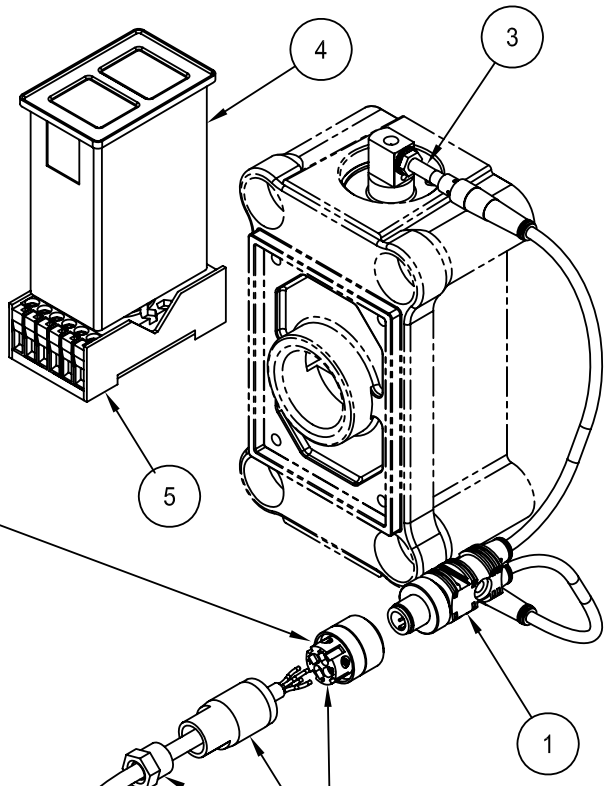
Item	Part Number	Description	Qty
1	111-009-000	Terminal Junction	1
2	241-004-000	Connector, Field Wiring	1
3	724-004-000	Sensor, Proximity	2
4	023-001-000	Amplifier, Switching	2
5	024-001-000	Socket, Amplifier	2

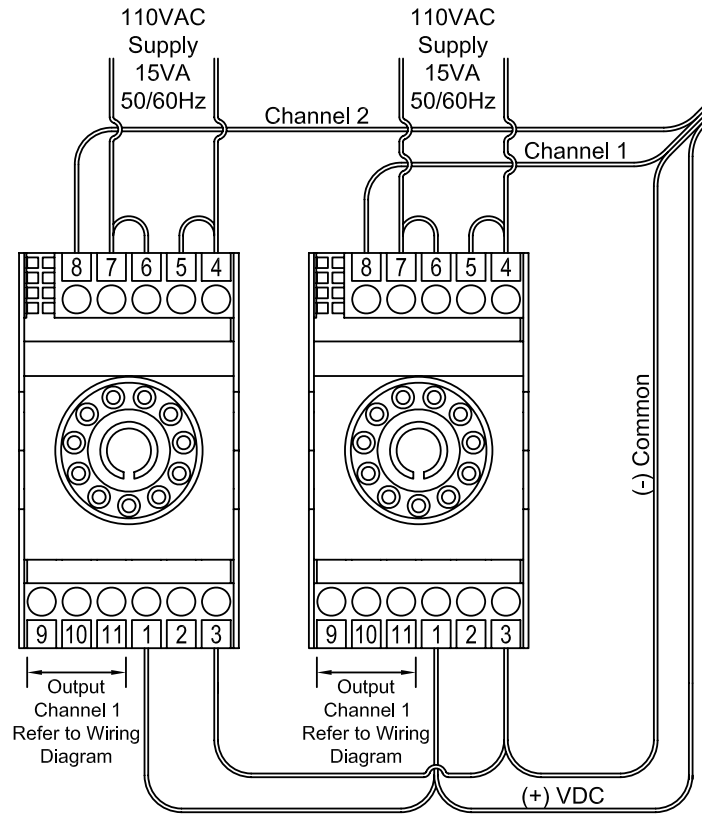
Notes:

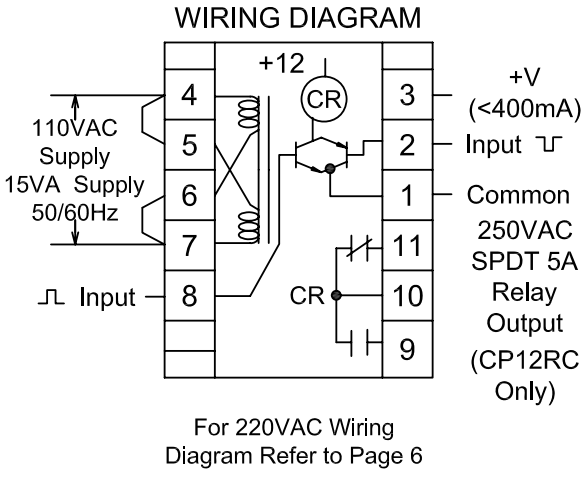
1. Air Valve, Gasket, and/or mounting hardware inluded in Pump Adapter Kit. Refer to Pulse Output Kit section chart (page 3) for proper selection



Connection	
1	(+) VDC
2	Output Channel #1
3	(-) Common
4	Output Channel #2




110VAC Supply 15VA 50/60Hz
110VAC Supply 15VA 50/60Hz
Channel 2
Channel 1
4 Conductor #22 AWG (Supplied by End-User)
8 7 6 5 4
9 10 11 1 2 3
Output Channel 1 Refer to Wiring Diagram
Output Channel 1 Refer to Wiring Diagram
(-) Common
(+) VDC



For 220VAC Wiring Diagram Refer to Page 6

Pulse Output Pump Kit: 475-244-002

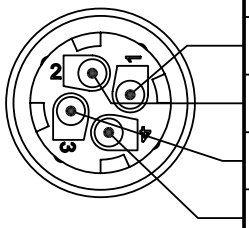
220VAC Wiring Diagram (For Non-Hazardous Locations)

475-244-002 Pulse Output Pump Kit

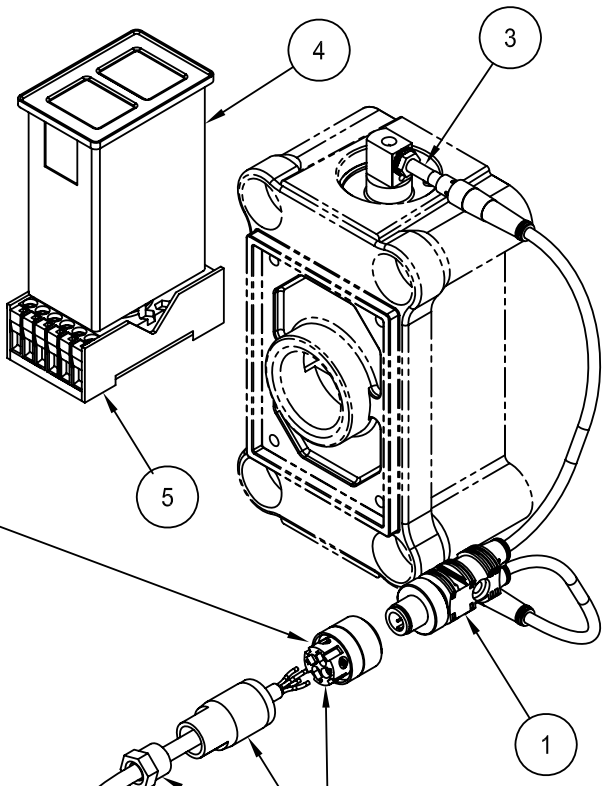
Item	Part Number	Description	Qty
1	111-009-000	Terminal Junction	1
2	241-004-000	Connector, Field Wiring	1
3	724-004-000	Sensor, Proximity	2
4	023-001-000	Amplifier, Switching	2
5	024-001-000	Socket, Amplifier	2

Notes:

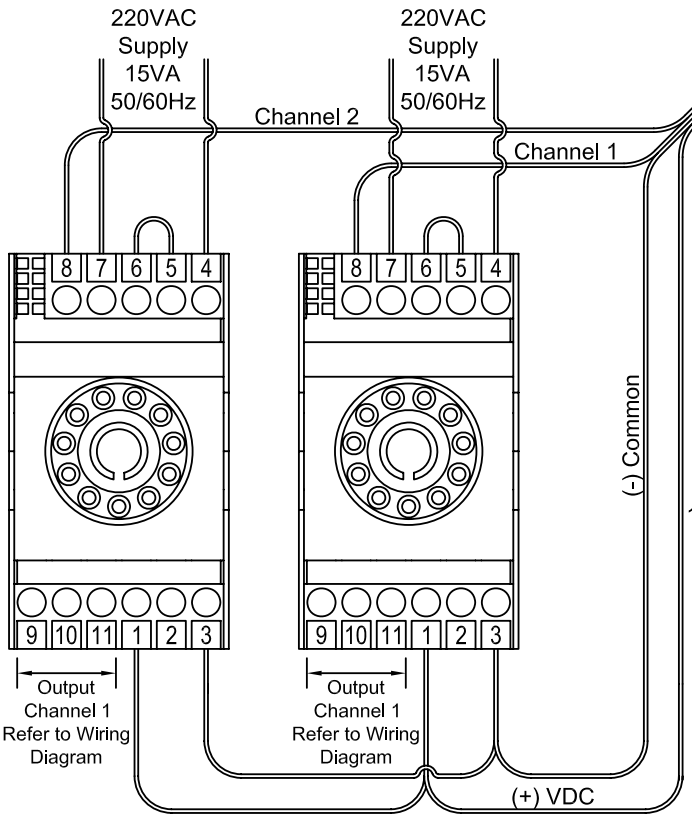
1. Air Valve, Gasket, and/or mounting hardware inluded in Pump Adapter Kit. Refer to Pulse Output Kit section chart (page 3) for proper selection



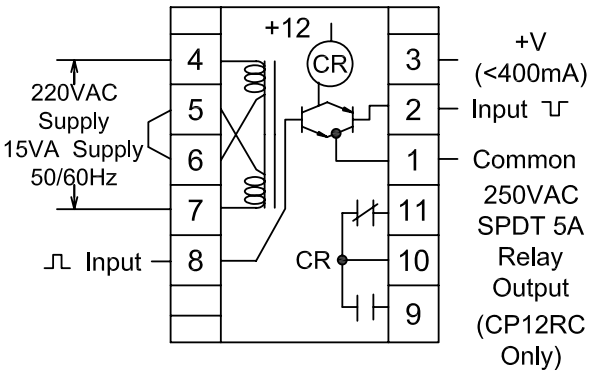
Connection	
1	(+) VDC
2	Output Channel #1
3	(-) Common
4	Output Channel #2



4 Conductor #22 AWG
(Supplied by End-User)



WIRING DIAGRAM



For 110VAC Wiring Diagram Refer to Page 5

Pulse Output Pump Kit: 475-244-003

20-125VDC, 20-250VAC Intrinsically Safe Wiring Diagram

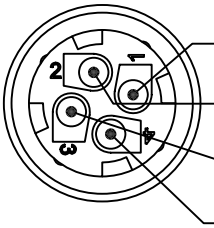
II2GD

475-244-002 Pulse Output Pump Kit

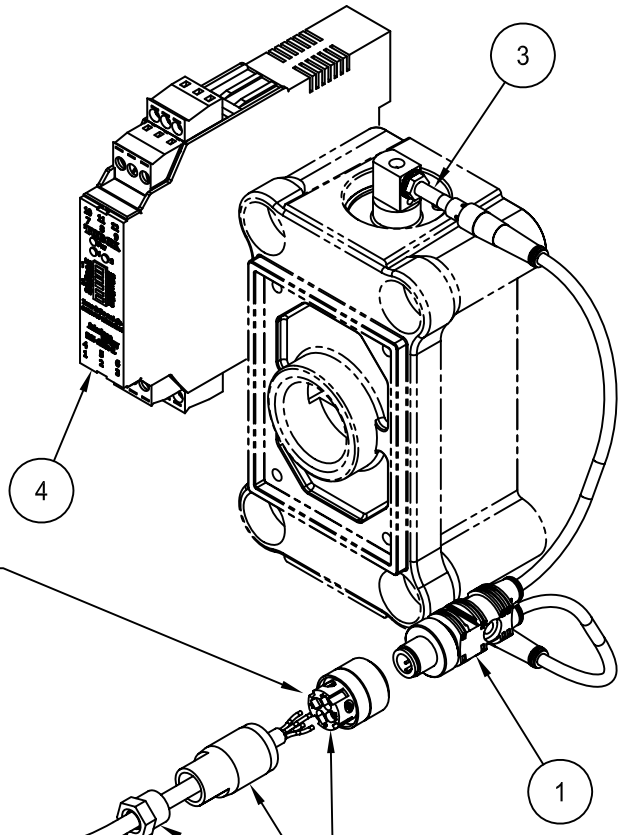
Item	Part Number	Description	Qty
1	111-010-000	Terminal Junction-NAMUR	1
2	241-004-000	Connector, Field Wiring	1
3	724-005-000	Sensor, Proximity-NAMUR	2
4	023-007-000	Amplifier, Switching-NAMUR	1

Notes:

1. Air Valve, Gasket, and/or mounting hardware inluded in Pump Adapter Kit. Refer to Pulse Output Kit section chart (page 3) for proper selection



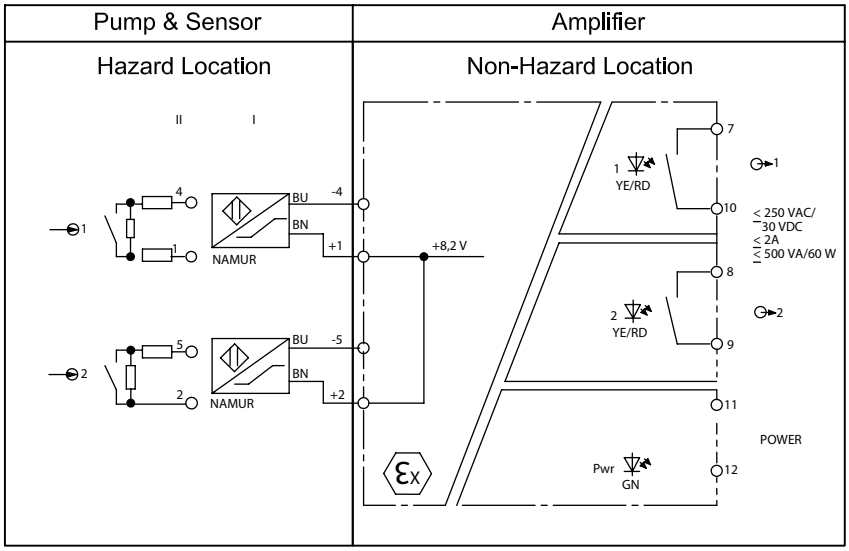
Intrinsically-Safe (Namur) Connection	
1	(+) Channel #1
2	(-) Channel #1
3	(+) Channel #2
4	(-) Channel #2



(5) (2) (1) (4)

023-007-000
Switching Amplifier
(Non-Harzardous Location)

4 Conductor #22 AWG
(Supplied by End-User)



(12) (11) (8) (9) (7) (10)

20-125VDC,
20-250VAC
40-70 Hz

Output Channel 1

Output Channel 2

To Customer Control
Refer to Amplifier Wiring Diagram

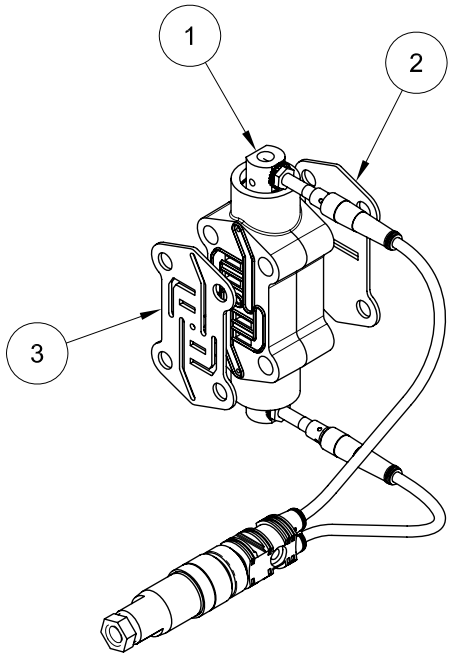
Pulse Output Pump Adapter Kit: 475-245-001

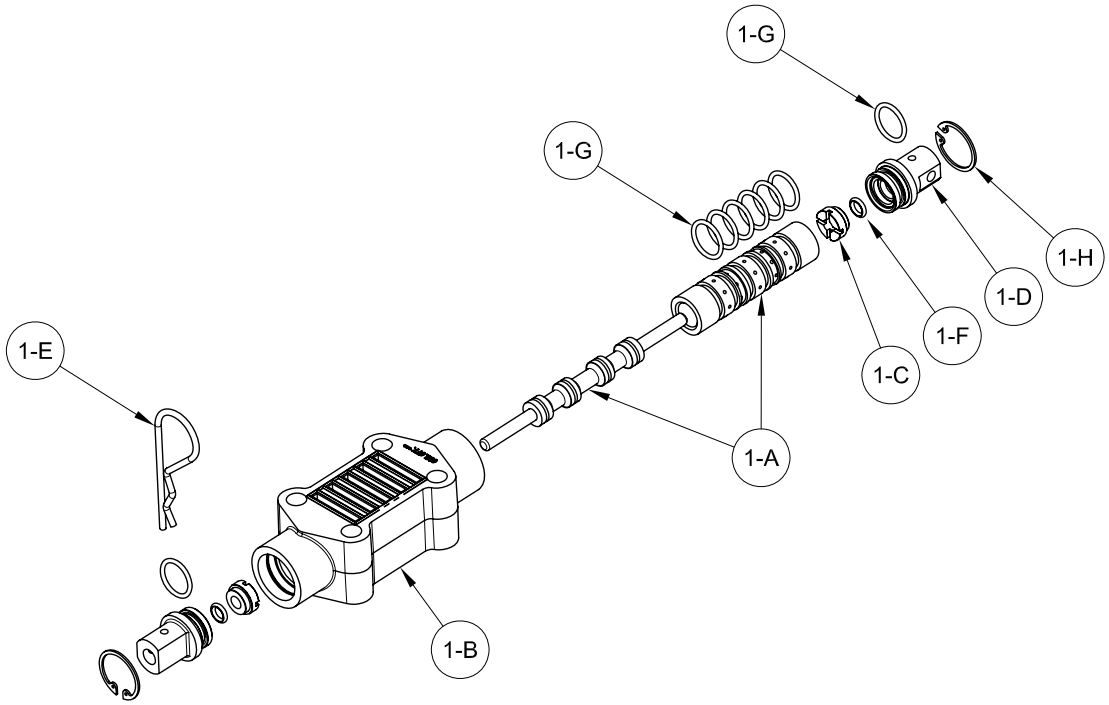
SANDPIPER Pumps (PB 1/4-A)

475-245-001 Pulse Output Pump Adapter Kit			
Item	Part Number	Description	Qty
1	031-110-000	Assembly, Air Valve	1
2	360-084-360	Gasket, Air Valve	1
3	360-085-360	Gasket, Air Valve	1
031-110-000 Main Air Valve Assembly			
Item	Part Number	Description	Qty
1-A	031-109-000	Sleeve & Spool w/Pin	1
1-B	095-077-551	Body, Main Air Valve	1
1-C	132-030-552	Bumper, Valve Spool	2
1-D	165-123-147	Cap, End	2
1-E	210-008-330	Clip, Safety	1
1-F	560-029-360	O-Ring	2
1-G	560-101-360	O-Ring	10
1-H	675-051-115	Ring, Retainer	2

Notes:

1. Proximity Sensors, Terminal Junction, and Connector shown in side view are included in Pulse Output Kit. Refer to Pulse Output Kit section chart (page 3) for proper selection.





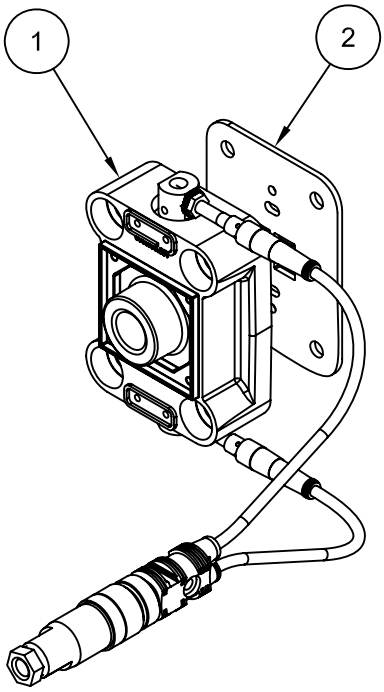
Pulse Output Pump Adapter Kit: 475-245-002

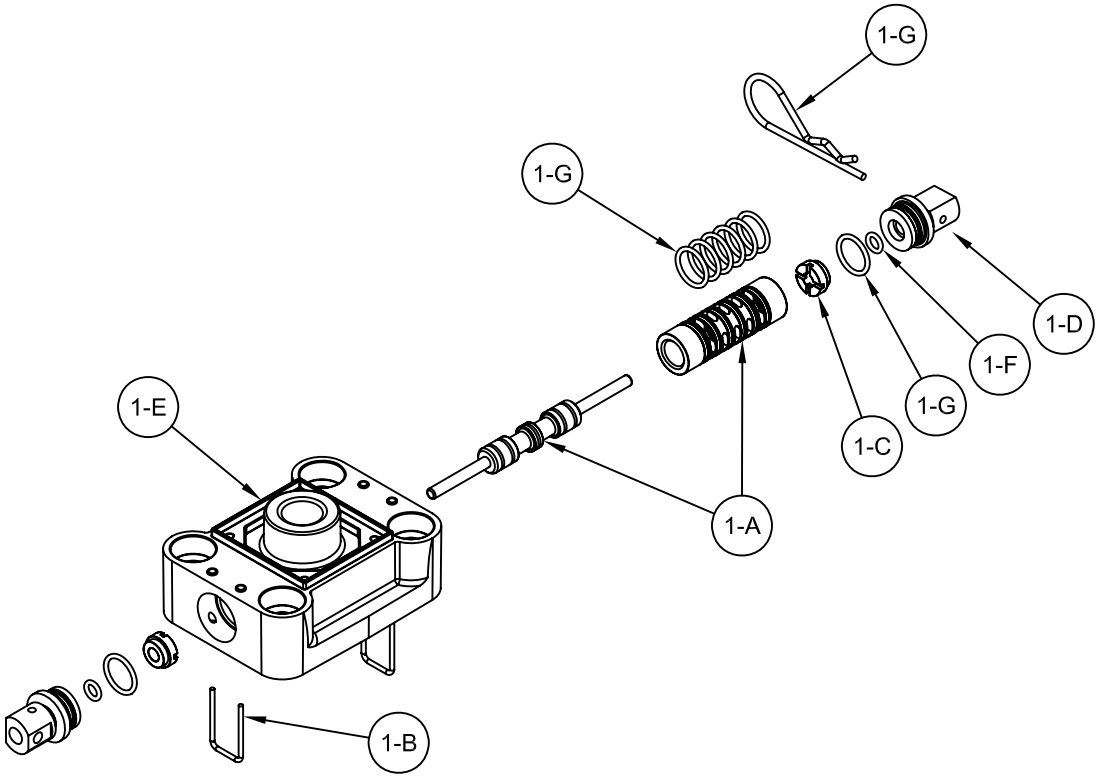
SandPIPER Pumps (S05 Metallic and S05, S07, S10 Non-Metallic)

475-245-002 Pulse Output Pump Adapter Kit			
Item	Part Number	Description	Qty
1	031-169-000	Assembly, Air Valve	1
2	360-102-360	Gasket, Air Valve	1
031-169-000 Main Air Valve Assembly			
Item	Part Number	Description	Qty
1-A	031-134-000	Sleeve & Spool w/Pin	1
1-B	095-106-559	Body, Main Air Valve	1
1-C	132-030-552	Bumper, Valve Spool	2
1-D	165-123-147	Cap, End	2
1-E	210-008-330	Clip, Safety	1
1-F	560-029-360	O-Ring	10
1-G	560-101-360	O-Ring	2
1-H	675-062-115	Ring, Retainer	2

Notes:

1. Proximity Sensors, Terminal Junction, and Connector shown in side view are included in Pulse Output Kit. Refer to Pulse Output Kit section chart (page 3) for proper selection.





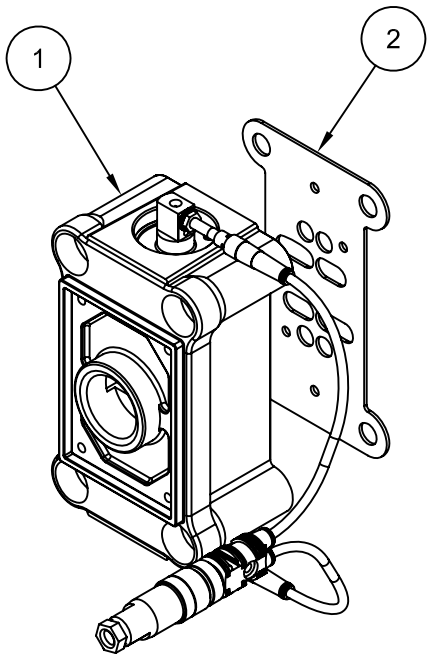
Pulse Output Pump Adapter Kit: 475-245-003

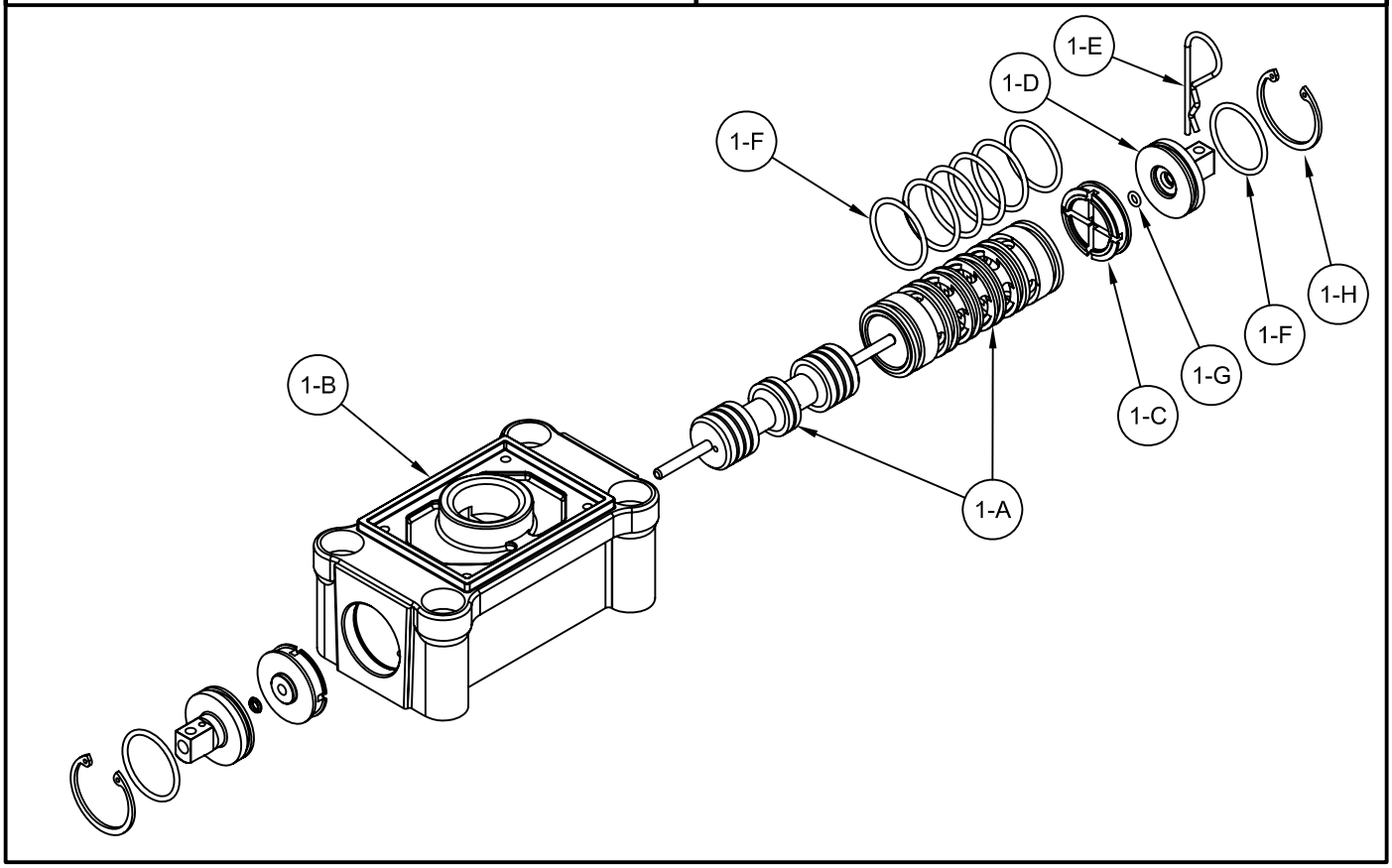
SandPIPER Pumps (S1F - S30 Metallic and Non-Metallic)

475-245-001 Pulse Output Pump Adapter Kit			
Item	Part Number	Description	Qty
1	031-147-000	Assembly, Air Valve	1
2	360-093-360	Gasket, Air Valve	1
031-147-000 Main Air Valve Assembly			
Item	Part Number	Description	Qty
1-A	031-139-000	Sleeve & Spool w/Pin	1
1-B	095-094-559	Body, Main Air Valve	1
1-C	132-029-552	Bumper, Valve Spool	2
1-D	165-098-147	Cap, End	2
1-E	210-008-330	Clip, Safety	1
1-F	560-020-360	O-Ring	8
1-G	560-029-360	O-Ring	2
1-H	675-044-115	Ring, Retainer	2

Notes:

1. Proximity Sensors, Terminal Junction, and Connector shown in side view are included in Pulse Output Kit. Refer to Pulse Output Kit section chart (page 3) for proper selection.





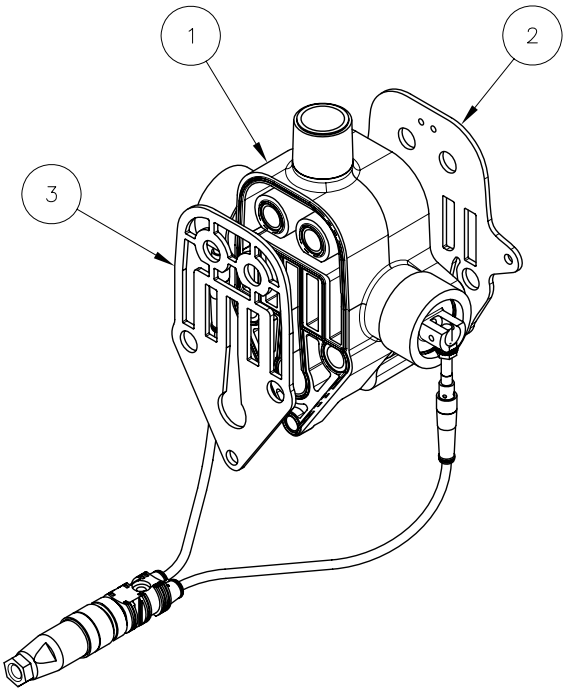
Pulse Output Pump Adapter Kit: 475-245-004

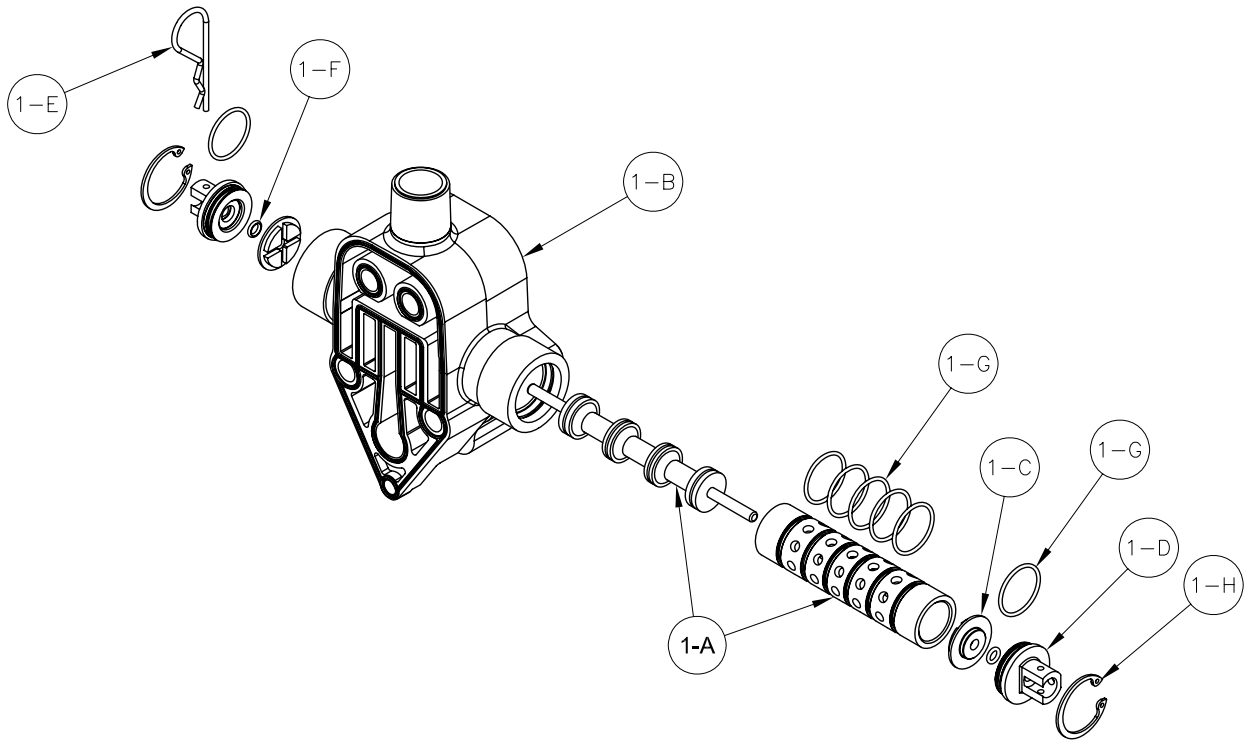
SANDPIPER Pumps (**HDF1 & SB1**)

475-245-004 Pulse Output Pump Adapter Kit			
Item	Part Number	Description	Qty
1	031-111-557	Assembly, Air Valve	1
2	360-057-360	Gasket, Air Valve	1
3	360-058-360	Gasket, Air Valve	1
031-111-558 Main Air Valve Assembly			
Item	Part Number	Description	Qty
1-A	031-083-000	Sleeve & Spool w/Pin	1
1-B	095-051-557	Body, Main Air Valve	1
1-C	132-028-552	Bumper, Valve Spool	2
1-D	165-078-147	Cap, End	2
1-E	210-008-330	Clip, Safety	1
1-F	560-029-360	O-Ring	2
1-G	560-058-360	O-Ring	8
1-H	675-043-115	Ring, Retainer	2

Notes:

1. Proximity Sensors, Terminal Junction, and Connector shown in side view are included in Pulse Output Kit. Refer to Pulse Output Kit section chart (page 3) for proper selection.





Pulse Output Pump Adapter Kit: 475-245-005

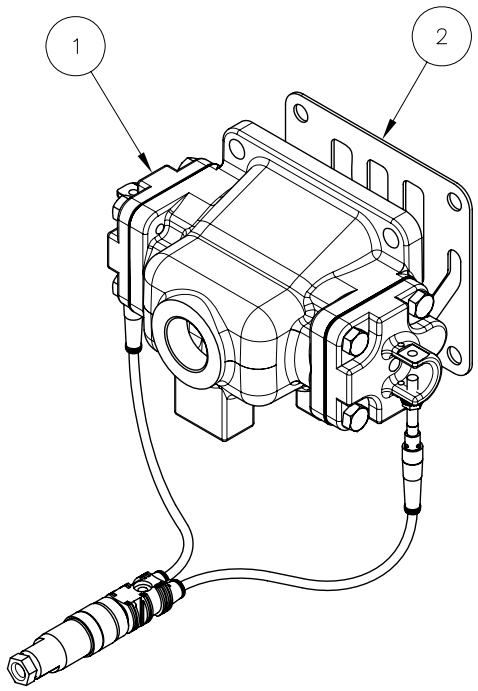
SANDPIPER Pumps (HD1 1/2-A, HDB2-A, and HDF2-A with Aluminum Midsections)

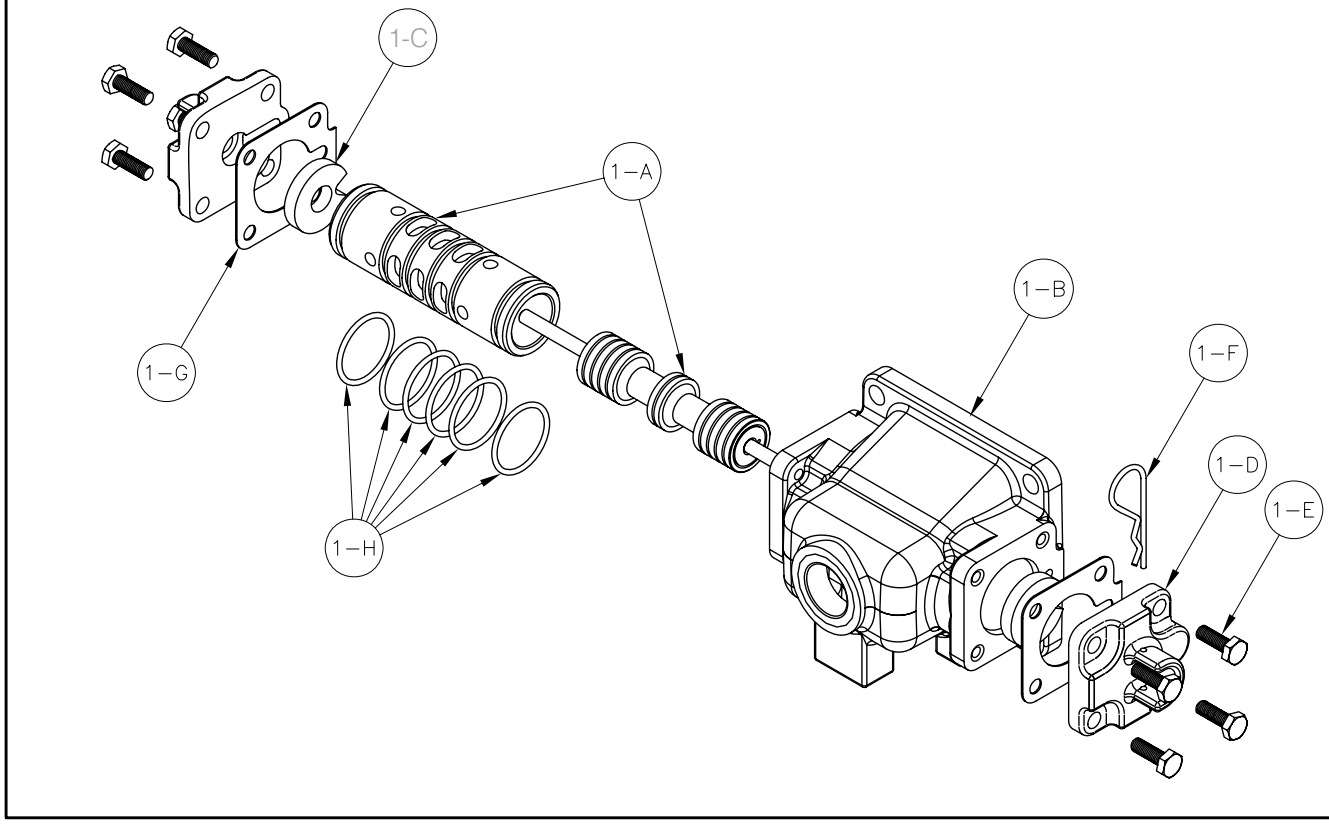
475-245-005 Pulse Output Pump Adapter Kit			
Item	Part Number	Description	Qty
1	031-089-156	Assembly, Air Valve	1
2	360-048-425	Gasket, Air Valve	1
031-089-156 Main Air Valve Assembly			
Item	Part Number	Description	Qty
1-A	031-066-000	Sleeve & Spool w/Pin	1
1-B	095-043-156	Body, Main Air Valve	1
1-C	132-014-358	Bumper, Valve Spool	2
1-D	165-066-010	Cap, End	2
1-E	170-032-115	Capscrew, Hex Head	8
1-F	210-008-330	Clip, Safety	1
1-G	360-010-425	Gasket, End Cap	2
1-H	560-020-360	O-Ring	6

Notes:

1. Proximity Sensors, Terminal Junction, and Connector shown in side view are included in Pulse Output Kit. Refer to Pulse Output Kit section chart (page 3) for proper selection.

2. Refer to page 15 for special assembly instructions





Pulse Output Pump Adapter Kit: 475-245-006

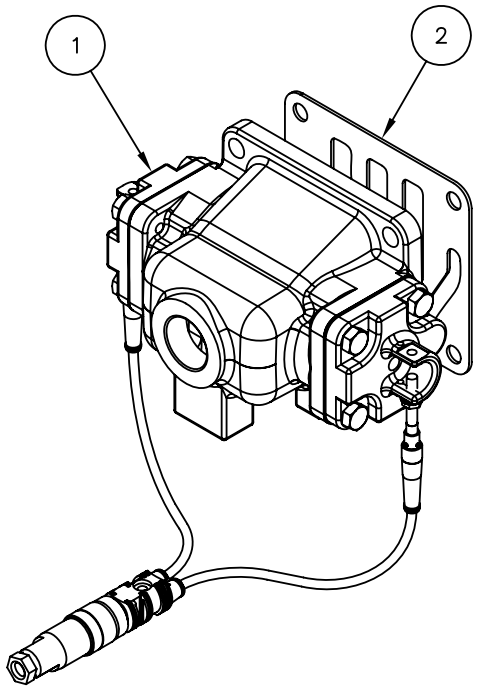
SandPIPER Pumps (HD1 1/2-A, HDB2-A, and HDF2-A with Cast Iron Midsections)

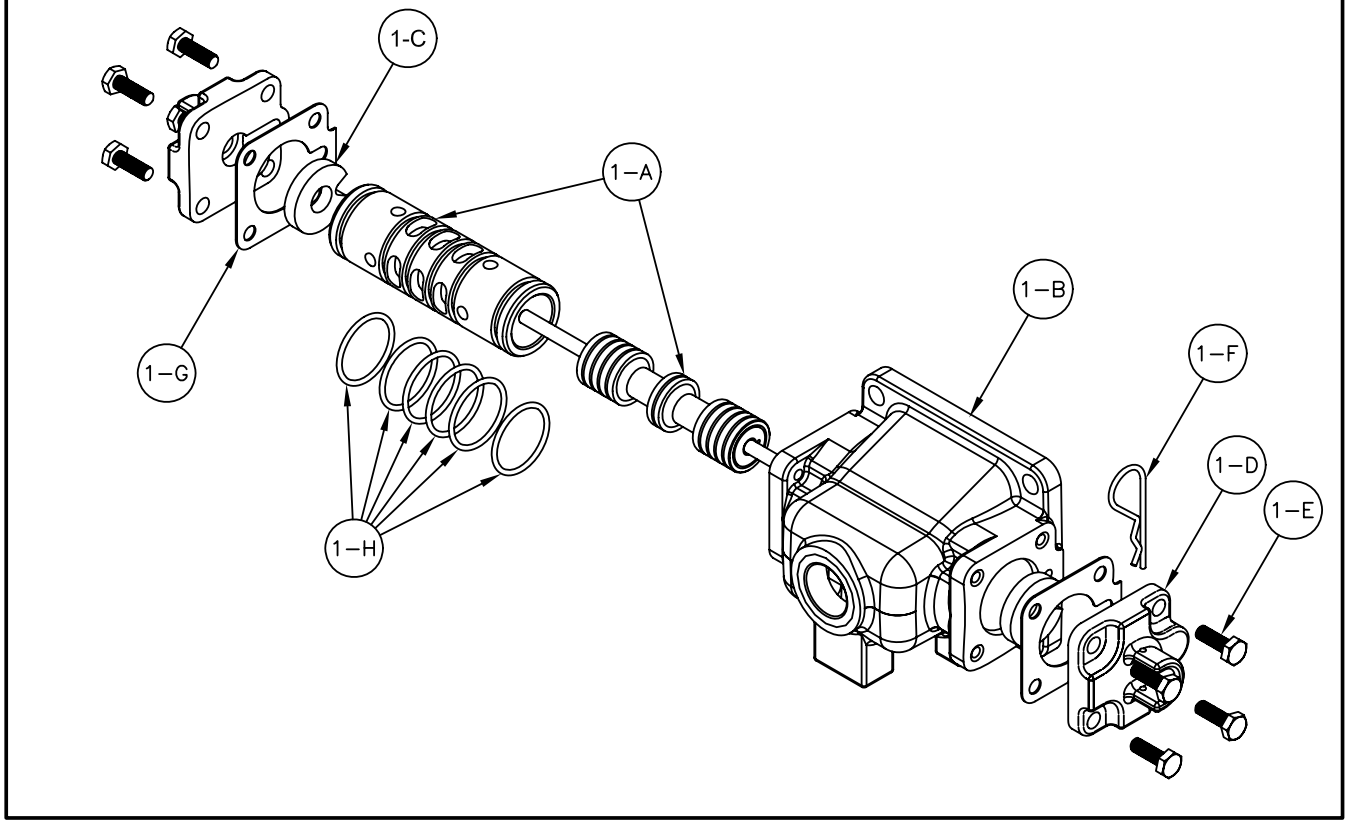
475-245-006 Pulse Output Pump Adapter Kit			
Item	Part Number	Description	Qty
1	031-089-010	Assembly, Air Valve	1
2	360-048-425	Gasket, Air Valve	1
031-089-010 Main Air Valve Assembly			
Item	Part Number	Description	Qty
1-A	031-066-000	Sleeve & Spool w/Pin	1
1-B	095-043-010	Body, Main Air Valve	1
1-C	132-014-358	Bumper, Valve Spool	2
1-D	165-066-010	Cap, End	2
1-E	170-032-115	Capscrew, Hex Head	8
1-F	210-008-330	Clip, Safety	1
1-G	360-010-425	Gasket, End Cap	2
1-H	560-020-360	O-Ring	6

Notes:

1. Proximity Sensors, Terminal Junction, and Connector shown in side view are included in Pulse Output Kit. Refer to Pulse Output Kit section chart (page 3) for proper selection.

2. Refer to page 15 for special assembly instructions





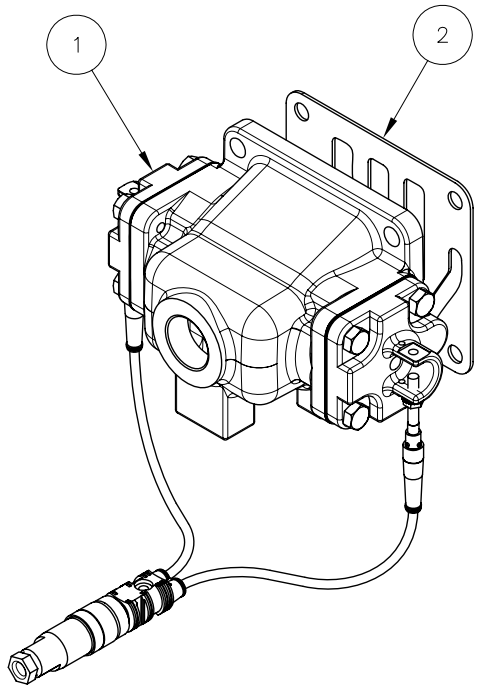
Pulse Output Pump Adapter Kit: 475-245-007

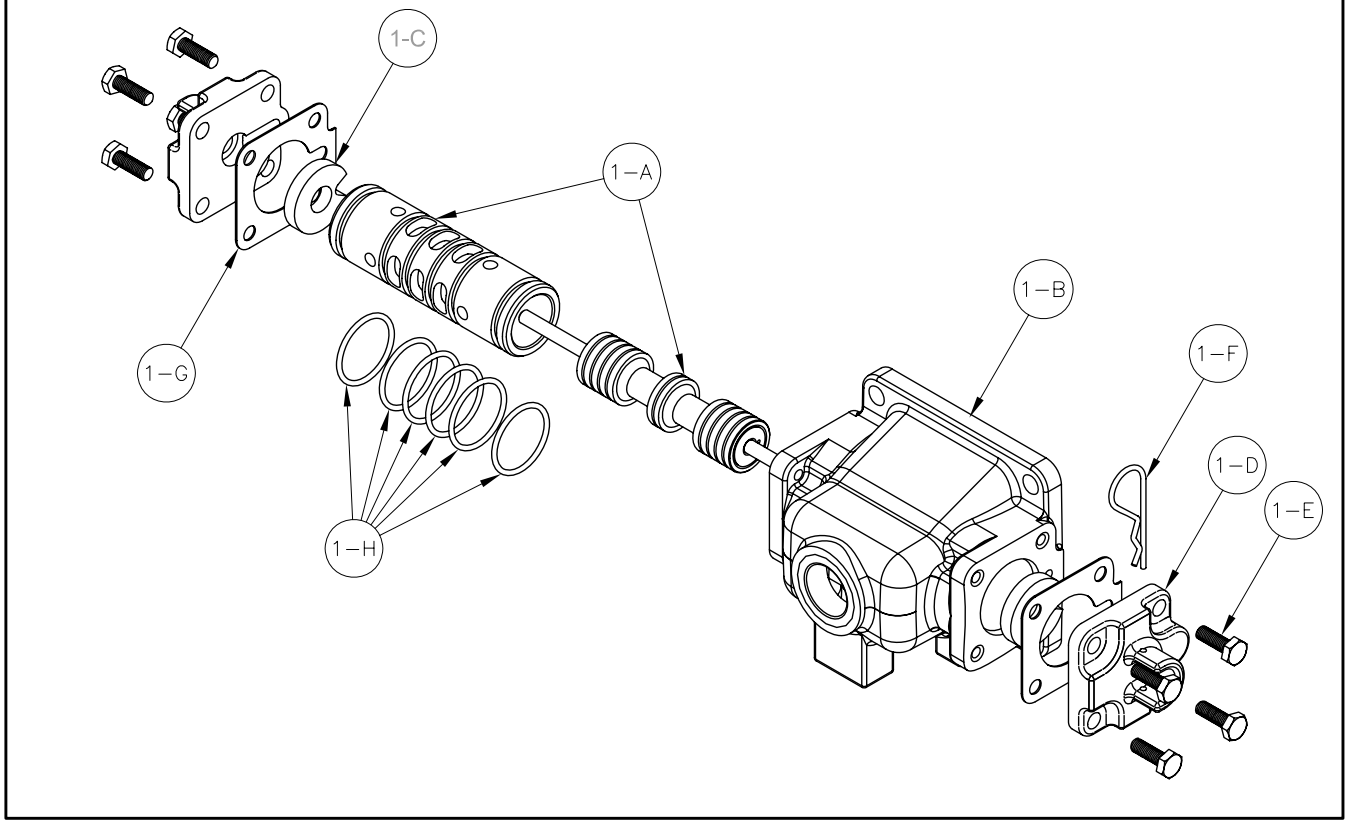
SANDPIPER Pumps (HDB3-A, HDB4-A, HDF3-M, and HDF4-M)

475-245-007 Pulse Output Pump Adapter Kit			
Item	Part Number	Description	Qty
1	031-090-010	Assembly, Air Valve	1
2	360-048-425	Gasket, Air Valve	1
031-090-010 Main Air Valve Assembly			
Item	Part Number	Description	Qty
1-A	031-069-000	Sleeve & Spool w/Pin	1
1-B	095-043-010	Body, Main Air Valve	1
1-C	132-014-358	Bumper, Valve Spool	2
1-D	165-066-010	Cap, End	2
1-E	170-032-115	Capscrew, Hex Head	8
1-F	210-008-330	Clip, Safety	1
1-G	360-010-425	Gasket, End Cap	2
1-H	560-020-360	O-Ring	6

Notes:

1. Proximity Sensors, Terminal Junction, and Connector shown in side view are included in Pulse Output Kit. Refer to Pulse Output Kit section chart (page 3) for proper selection.





Pulse Output Pump Adapter Kit: 475-245-008 & 475-245-009

SANDPIPER Pumps (HDF3-A and HDF4-A (475-245-008), and ST1 1/2-A (475-245-009)

475-245-008 Pulse Output Pump Adapter Kit (see below)

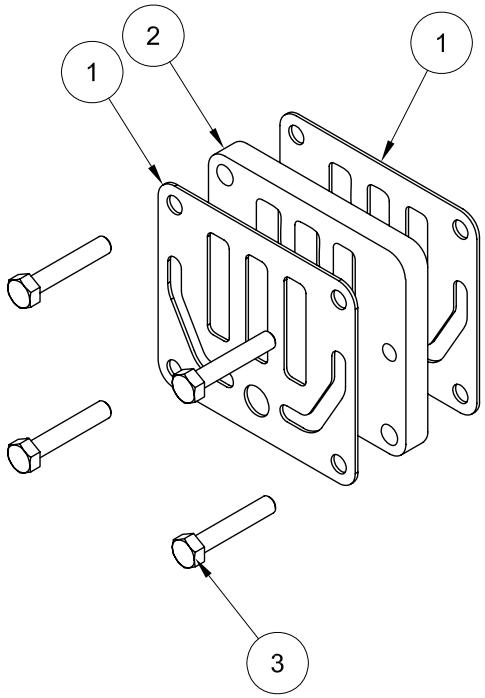
Item	Part Number	Description	Qty
1	031-089-156	Assembly, Air Valve	1
2	360-048-425	Gasket, Air Valve	2
3	612-139-552	Plate, Spacer	1
4	170-069-330	Capscrew, Hex Hd	1
5	210-008-330	Clip, Lockout	1

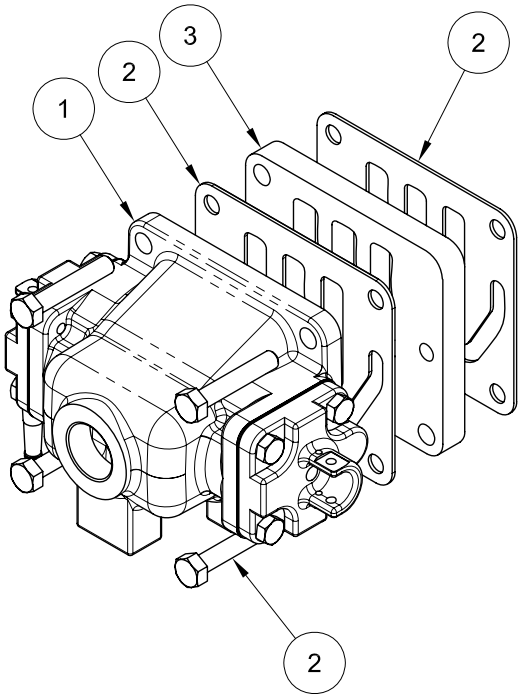
475-245-009 Pulse Output Pump Adapter Kit (see right)

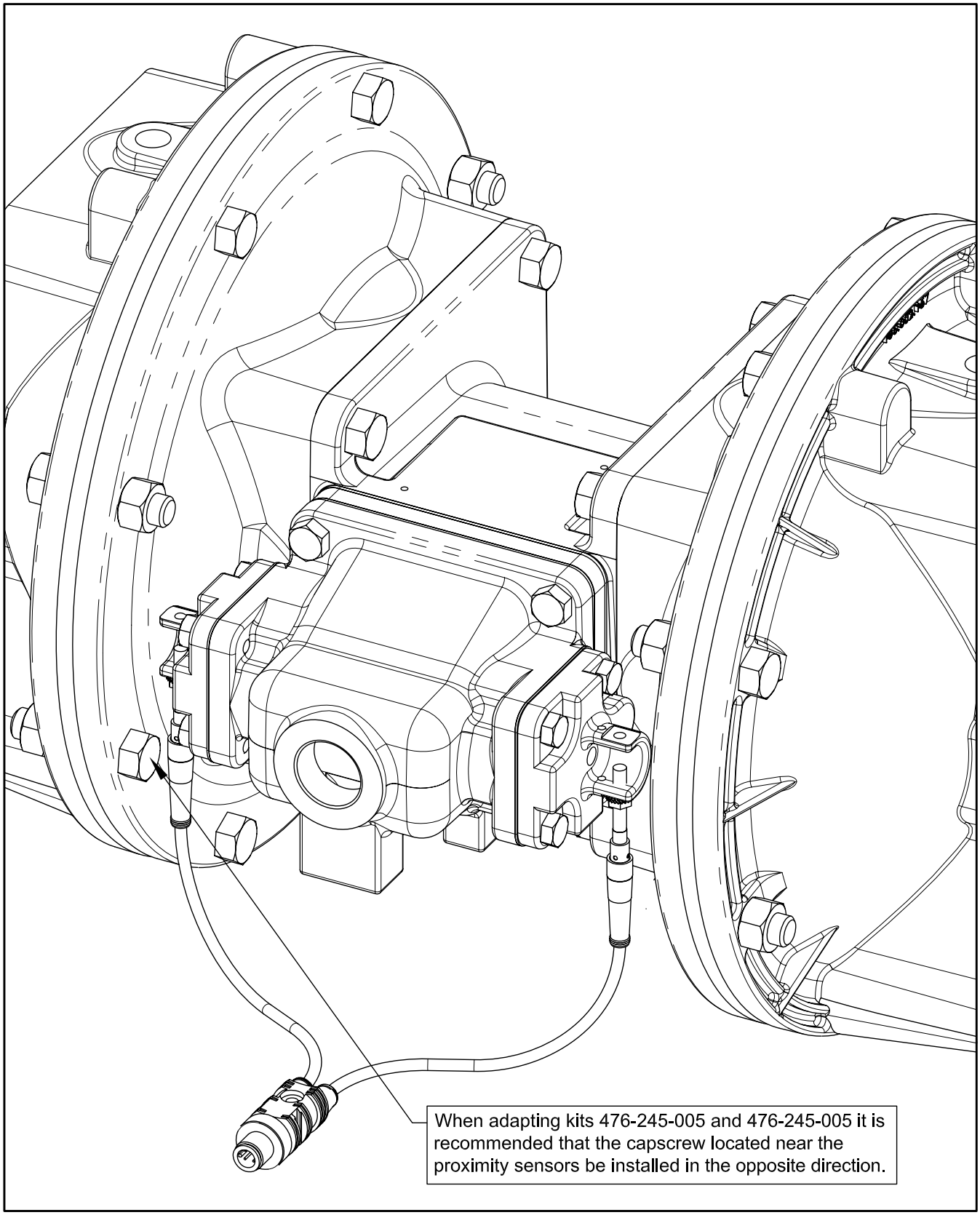
Item	Part Number	Description	Qty
1	360-048-425	Gasket, Air Valve	2
2	612-139-552	Plate, Spacer	1
3	170-069-330	Capscrew, Hex Hd	1

Notes:

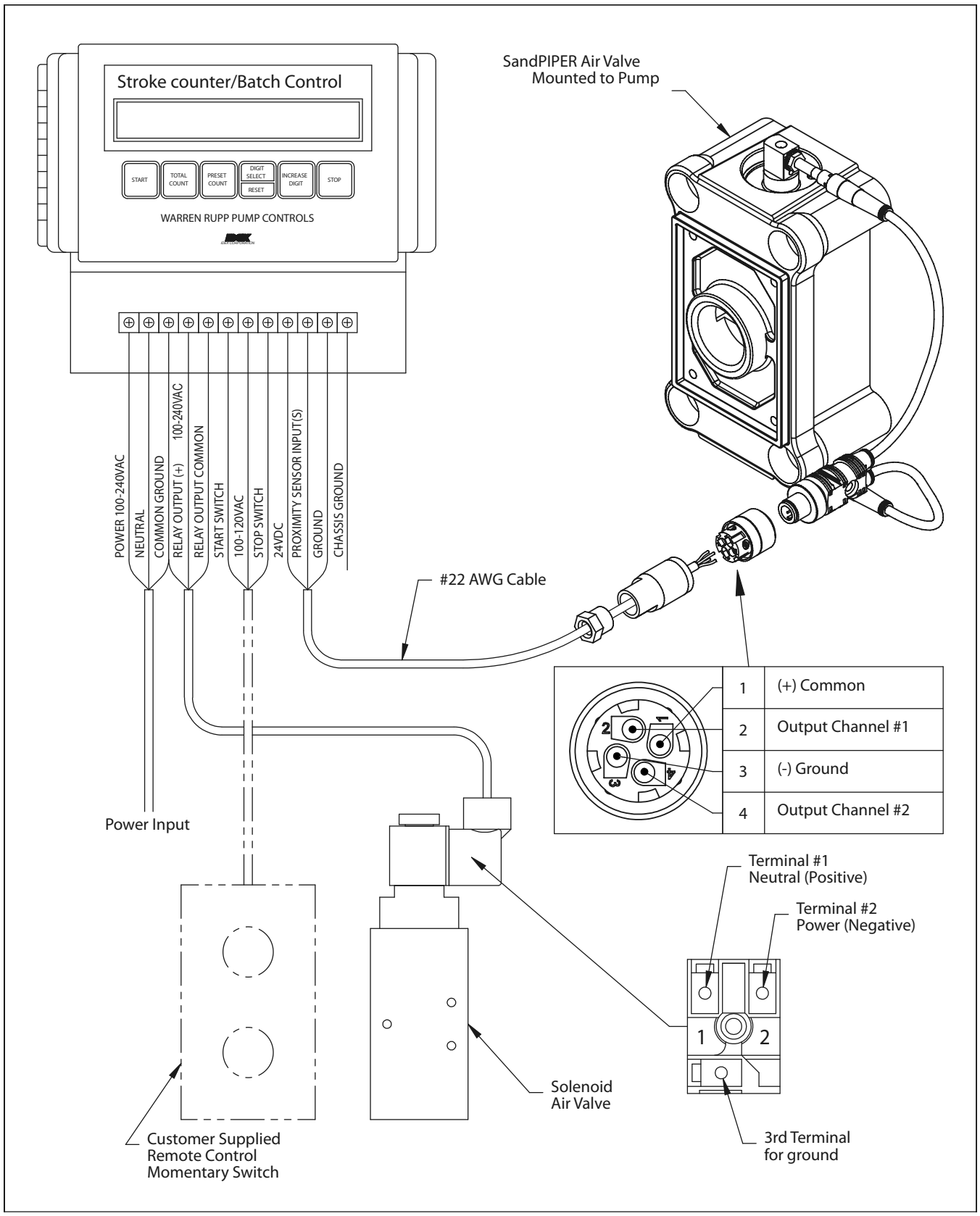
1. Kit 475-245-009 does not include Air Valve 031.089.156 Air Valve. The ST1 1/2 pump for which it is intended is already equipped with this valve.






When adapting kits 476-245-005 and 476-245-005 it is recommended that the capscrew located near the proximity sensors be installed in the opposite direction.

Wiring Diagram for Interface
with 249-006-000 Batch Control / Stroke Counter (Non-Hazardous Location)



Wiring Diagram for NAMUR Interface

Intrinsically-Safe (NAMUR) Interface with 249-006-000 Batch Control / Stroke Counter 100-120/240VAC